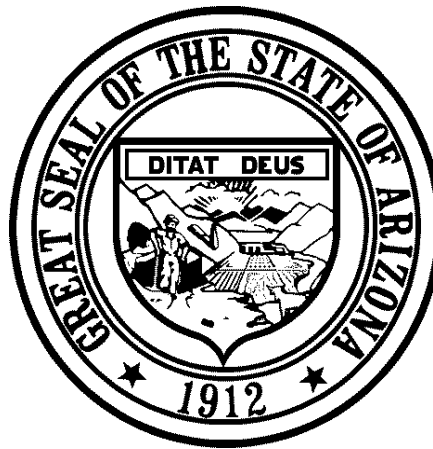


ARIZONA DEPARTMENT OF WATER RESOURCES

SURFACE WATER MANAGEMENT DIVISION

Dam Safety Section



INSTRUCTIONS FOR FILING AN APPLICATION

INTRODUCTION

This guide for filing an application has been prepared to facilitate the applicant's understanding of the application process. Any omissions or errors do not relieve the applicant from complying with applicable sections of Arizona Revised Statutes Title 45-Waters, Chapter 6 and Arizona Administrative Code Title 12–Natural Resources, Chapter 15–Department of Water Resources. The applicant must review and comply with these documents.

Arizona Revised Statutes Title 45, Chapter 6, Article 1 (A.R.S.) 45-1203, A.R.S. 45-1206 and A.R.S. 45-1207 require written approval of an application prior to construction of a new dam, or the enlargement, repair, alteration, or removal of an existing dam. The application process must comply with the Arizona Administrative Code (A.A.C.) R12-15-1207, which also defines specific situations that do not require an application.

In accordance with A.A.C. R12-15-1207, an applicant must contact the Department's Dam Safety Section at (602) 417-2445 to schedule pre-application conferences. These conferences are to discuss the requirements of the Director for specific applications and to answer any questions. In accordance with A.R.S. 45-1214 and A.A.C. R12-15-1207 Dam Safety staff will visit the dam site with the applicant during the pre-application period. Depending on the hazard classification and type of proposed construction, an application must comply with the following:

- To construct, reconstruct, repair, enlarge, or alter a high or significant hazard potential dam, an application must comply with the Arizona Administrative Code (A.A.C.) R12-15-1208.
- To breach or remove a high or significant hazard potential dam, an application must comply with A.A.C. R12-15-1209.
- To construct, reconstruct, repair, enlarge, alter, breach, or remove a low hazard potential dam, an application must comply with A.A.C. R12-15-1210.
- To construct, reconstruct, repair, enlarge, alter, breach, or remove a very low hazard potential dam, an application must comply with A.A.C. R12-15-1211

All application packages must be prepared in duplicate and received by the Arizona Department of Water Resources (Department) Dam Safety Section by appointment. The Dam Safety Section is located at 500 North Third Street, Phoenix, Arizona 85004-3903; telephone number (602) 417-2445.

In addition to the duplicate application form provided by the Director, two complete sets of construction documents including engineering drawings, specifications, engineering reports, calculations, and other supporting information must be submitted to the Department by appointment with the proper filing fee. The required documents are described in detail in the Department's guide titled "Checklist of Items Required for a Complete Application" which must also be completed and included with the application. These documents must be prepared by a professional engineer registered in Arizona to a level of detail appropriate for construction. The design engineer must be experienced in the design and construction of dams. The engineer's professional seal and signature must appear on all submitted drawings, specifications, engineering reports, and calculations.

As prescribed in A.R.S. 45-1204 and A.A.C. R12-15-151, no application shall be given consideration unless accompanied by a filing fee based on the estimated cost of the project (see the following section on Fee Requirements), as well as all required supporting documentation. The Director may waive or increase any requirements for information to accompany an application. During the appointment where the Department receives the application, a brief review of the application will be conducted to determine if the application contains each of the items required in the "Checklist of Items Required for a Complete Application" pursuant

to A.A.C. R12-15-1208, R12-15-1209, R12-15-1210 or R12-15-1211, as applicable.

Following receipt of an application and fee, the Department will conduct an administrative review of the application and supporting documentation defined in the “Checklist of Items Required for a Complete Application” and notify the applicant in writing whether the application is administratively complete. If the application is not administratively complete, the notification will include a list of additional information that is required to complete the application. The Department will also notify other agencies that we have received an application.

In accordance with A.A.C. R12-15-401 and A.A.C. R12-15-1207, the administrative completeness review time-frame is 120 days from the day the Department receives the application. The time-frame is suspended once a notification requesting additional information is mailed until the date the applicant responds with the additional information. Additional information requested must be supplied within 60 days of the date of the notice, or within another time-frame agreed upon by the Department. Failure to complete the application within the specified time-frame may deem the application withdrawn and the Department would close the file.

After the application has been determined to be administratively complete (i.e., contains all the required supporting documentation completed to a level of detail appropriate for construction), the Department will begin a substantive review. The substantive review time-frame is 60 days from the day the Department determines that the application is administratively complete. The Department will notify the applicant in writing of any defects and conduct one or more conferences, if necessary, to delineate revisions to the documents that will meet the Department’s substantive review requirements. The time-frame is suspended once a notification requesting additional information is mailed and until the date the applicant responds with the additional information.

Once the Department has completed its substantive review, the applicant will be notified in writing that the application is either approved or denied. If the application is denied, the Department will provide written justification for the denial and a written explanation of the applicant’s right to appeal.

After the Department has completed its substantive review and approved the application, revised sets of construction documents (engineering drawings, specifications, construction quality assurance plan, and construction schedule) incorporating any required changes must be submitted in triplicate to the Department to receive the Department’s approval stamp. One set of the construction documents, containing the Department’s approval stamp, will be returned to the applicant and must be retained on site during construction, one set will be retained for permanent State record, and another will be retained for use by the Department during construction. In addition to the construction documents, a revised engineering design report may also be required. An operation and maintenance plan, and an emergency action plan must also be submitted, unless they are planned to be submitted during construction pursuant to A.A.C. R12-15-1208(B) or as otherwise approved by the Director.

FEE REQUIREMENTS

Payment of the filing fee is required pursuant to A.R.S. 45-1204 and A.A.C. R12-15-151 for all applications. The Department may not consider or permit construction until the filing fee has been paid. The fee is based upon the total project costs associated with construction of the dam and appurtenant works integral to the design and safe operation of the dam. Preliminary investigations and surveys, engineering designs, the Department's application requirements, administration and supervision of construction, and any other engineering costs related to construction shall also be included.

Based upon these total costs and pursuant to A.A.C. R12-15-151(B)(11), the fee will be computed to the nearest dollar according to the following schedule:

- For the first \$100,000 of the estimated cost, two (2.0 %) percent.
- For the next \$400,000, one and one-half (1.5 %) percent.
- For the next \$500,000, one (1.0 %) percent.
- For all costs in excess of \$1,000,000, one-half of one (0.5 %) percent.

Example estimated fee calculation (fee must accompany the application):

<i>ESTIMATED COST</i>	\$6,420,000.00
2% x \$100,000.....	2,000.00
1.5% x \$400,000.....	6,000.00
1% x \$500,000.....	5,000.00
0.5% x \$5,420,000.....	27,100.00
	<u> + </u>
<i>ESTIMATED FEE</i>	\$40,100.00

Upon completion of the project, pursuant to A.R.S. 1209(C) the actual total cost shall be tabulated using the sample Affidavit of Total Cost shown in the Department's document titled "Requirements During and Following Construction of High and Significant Hazard Dams". The application fee must be recomputed using the Example Final Fee Calculation also shown in the Department's document titled "Requirements During and Following Construction of High and Significant Hazard Dams". If the recomputed fee exceeds the fee paid with the application by \$50.00 or more, then the owner shall pay the difference between the fee already paid and the recomputed fee. If the recomputed fee is less than the original fee by an amount of \$50.00 or more, then the owner shall be entitled to a refund by the amount of the difference between the fee already paid and the recomputed fee.

LIST OF REFERENCES

Included below is a brief list of references, which have proved useful in solving basic dam design problems. The list is not all-inclusive. Many of these references include comprehensive bibliographies, which may provide additional assistance in locating more detailed or more recent reference materials. When complex dam design problems are encountered, it is advisable to retain a qualified specialist engineer.

AMERICAN SOCIETY OF CIVIL ENGINEERS, U.S. COMMITTEE ON LARGE DAMS, Design and Construction of Dams, 1967.

ARIZONA DEPARTMENT OF WATER RESOURCES, SURFACE WATER DIVISION, SAFETY OF DAMS SECTION, (Draft) Guidelines for the Determination of Spillway Capacity Requirements, (Revised 1996).

CEDERGREN, H.R., Seepage, Drainage, and Flow Nets, Second Edition, New York, John Wiley and Sons, Inc., 1977.

CHANG, H.H., Energy Expenditure in Curved Open Channels, Journal of Hydraulic Engineering, Vol. 109, No. 7, 1983.

CHANG, H.H., Variation of Flow Resistance Through Curved Channels, Journal of Hydraulic Engineering, Vol. 110, No. 12, 1984.

CHOW, V.T., Open-Channel Hydraulics, New York, McGraw-Hill Book Co., 1959.

CHOW, V.T., Handbook of Applied Hydrology, New York, McGraw-Hill Book Co., 1964.

COMMITTEE ON SAFETY OF EXISTING DAMS, Safety of Existing Dams--Evaluation and Improvement, Prepared under auspices of Water Science and Technology Board, Commission on Engineering and Technical Systems, National Research Council, Washington, D.C., National Academy Press, 1983.

DAVIS, C.V. and K.E. SORENSEN, Handbook of Applied Hydraulics, New York, McGraw-Hill Book Co., Inc., 3rd Edition, 1969.

FEDERAL EMERGENCY MANAGEMENT AGENCY, Dam Safety: An Owner's Guidance Manual, FEMA 145, 1987.

HANSEN, E.M., J.T. RIEDELL, and F.K. SCHWARTZ, Probable Maximum Precipitation Estimates--Colorado River and Great Basin Drainages, Hydrometeorological Report 49, Silver Spring, Maryland, National Weather Service, National Oceanic and Atmospheric Administration, U.S. Department of Commerce, 1977.

IPPEN, A.T., Study of High Velocity Flow in Curved Channels of Rectangular Cross Sections, American Geophysical Union Transactions, Vol. 17, pp. 516-521, 1936. IPPEN, A.T., Mechanics of Supercritical Flow, American Society of Civil Engineers Transactions, Vol. 116, Paper No. 2434, pp 268-296, 1951.

IPPEN, A.T., Design of Channel Contractions, American Society of Civil Engineers Transactions, Vol. 116, Paper No. 2434, pp 326-346, 1951.

JAMES, C.S., Evaluation of Methods for Predicting Bend Loss In Meandering Channels, Journal of Hydraulic Engineering, Vol. 120, No. 2, 1994.

KING, H.W. and E.F. BRATER, Handbook of Hydraulics, 5th Edition, New York, McGraw-Hill Book Co., Inc., 1963.

KNAPP, R.T., Design of Channel Curves for Supercritical Flow, American Society of Civil Engineers Transactions, Vol. 116, Paper No. 2434, pp 296-325, 1951.

MAIDMENT, D.R., Handbook of Hydrology, New York, McGraw-Hill, Inc., 1993.

MOCKMORE, C.E., Flow Around Bends in Stable Channels, American Society of Civil Engineers Transactions, Vol. 109, Paper No. 2217, pp. 593-618, 1944.

REINAUER, R. and W.H. FELLOW, Supercritical Bend Flow, Journal of Hydraulic Engineering, Vol. 123, No. 3, 1997.

ROUSE, H., Engineering Hydraulics, Proceedings of the Fourth Hydraulics Conference Iowa Institute of Hydraulic Research, June 12-15, 1949, New York, John Wiley & Sons, Inc., 1950.

ROUSE, H., b.v. HOOTA, and E. HSU, Design of Channel Expansions, American Society of Civil Engineers Transactions, Vol. 116, Paper No. 2434, pp 347-400, 1951.

SHERARD, J.R., R.J. WOODWARD, S.F. GIZIENSKI and W.A. CLEVINGER, Earth and Earth-Rock Dams, New York, John Wiley and Sons, Inc., 1963.

SHUKRY, A., Flow Around Bends in an Open Flume, American Society of Civil Engineers Transactions, Vol. 115, Paper No. 2411, 1950.

U.S. DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, Earth Dams and Reservoirs, TR-60, 1985.

U.S. DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, Earth Spillways, TR-2, 1956.

U.S. DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, Gated Outlet Appurtenances for Earth Dams, TR-46, 1982.

U.S. DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, Guide for Design and Layout of Earth Emergency Spillways as Part of Emergency Spillway Systems for Earth Dams, TR-52, 1973.

U.S. DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, Riprap Lined Plunge Pool for Cantilever Outlet, DN-6, 1986.

U.S. DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, Riprap for Slope Protection Against Wave Action, TR-69, 1983.

U.S. DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, Criteria for the Hydraulic Design of Impact Basins Associated with Full Flow in Pipe Conduits, TR-49, 1971.

U.S. DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, Design and Analysis of Rock Chutes, DN-22, 1983.

U.S. DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, Hydraulics of Broadcrested Spillways, TR-39, 1968.

U.S. DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, Hydraulic Design of the Box-Inlet Drop Spillway, AH-301, 1966.

U.S. DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, Flow Net Construction and Use, SMN-5, 1973.

U.S. DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, Gradation Design of Sand and Gravel Filters, 26 NEH-633-26, 1994.

U.S. DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, Mechanics of Seepage Analysis, SMN-7, 1979.

U.S. DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, Soil Mechanics Considerations for Embankment Drains, SMN-3, 1971.

U.S. DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, Chute Spillways, NEH-14, 1977.

U.S. DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, Drop Spillways, NEH-11, 1968.

U.S. DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, Structural Design of SAF Stilling Basins, TR-54, Revised 1981.

U.S. DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, Structural Design of Monolithic Straight Drop Spillways, TR-63, 1977.

U.S. DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, Structural Design of Underground Conduits, TR-5, 1958.

U.S. DEPARTMENT OF THE ARMY, CORPS OF ENGINEERS, Recommended Guidelines for Safety Inspection of Dams.

U.S. DEPARTMENT OF THE ARMY, CORPS OF ENGINEERS, Geotechnical Investigations, ENG 1836, ENG 1836A, EM 1110-1-1804, 1984.

U.S. DEPARTMENT OF THE ARMY, CORPS OF ENGINEERS, Hydraulic Design of Spillways, EM 1110-2-1603, 1990.

U.S. DEPARTMENT OF THE ARMY, CORPS OF ENGINEERS, Hydraulic Design of Reservoir Outlet Works, EM 1110-2-1602, 1980.

U.S. DEPARTMENT OF THE ARMY, CORPS OF ENGINEERS, Hydraulic Design of Flood Control Channels, Change 1 Incorporated, EM 1110-2-1601, 1991

U.S. DEPARTMENT OF THE ARMY, CORPS OF ENGINEERS, Seepage Analysis and Control for Dams

CH 1, EM 1110-2-1901, 1986.

U.S. DEPARTMENT OF THE ARMY, CORPS OF ENGINEERS, Stability of Earth and Rock Fill Dams CH 1, EM 1110-2-1902, 1970.

U.S. DEPARTMENT OF THE ARMY, CORPS OF ENGINEERS, Gravity Dam Design, EM 1110-2-2200, 1995.

U.S. DEPARTMENT OF THE ARMY, CORPS OF ENGINEERS, Instrumentation of embankment Dams and Levees, EM 1110-2-1908, 1995.

U.S. DEPARTMENT OF THE ARMY, CORPS OF ENGINEERS, Construction Control for Earth & Rock-Fill Dams, EM 1110-2-1911, 1995.

U.S. DEPARTMENT OF THE ARMY, CORPS OF ENGINEERS, Arch Dam Design, EM 1110-2-2201, 1994.

U.S. DEPARTMENT OF THE ARMY, CORPS OF ENGINEERS, Earth & Rock-Fill Dams General Design & Construction Considerations, EM 1110-2-2300, 1994.

U.S. DEPARTMENT OF THE ARMY, CORPS OF ENGINEERS, Structural Design of Spillways and Outlet Works, EM 1110-2-2400, 1964.

U.S. DEPARTMENT OF THE INTERIOR, BUREAU OF RECLAMATION, Discharge Coefficients for Irregular Overfall Spillways, Engineering Monographs No. 9, 1952.

U.S. DEPARTMENT OF THE INTERIOR, BUREAU OF RECLAMATION, Design of Small Dams, A Water Resources Technical Publication, 3rd Edition, Washington, D.C., U.S. Government Printing Office, 1987.

VRIEND, H.J. and H.J. GELDOF, Main Flow Velocity in Short River Bends, Journal of Hydraulic Engineering, Vol. 109, No. 7, 1983.